

What Is Claimed Is:

1 1. A microrelay, comprising:
2 a first signal line;
3 a second signal line;
4 a contact head configured to make an electrical connection between the
5 first signal line and the second signal line; and
6 an electro-thermal actuator coupled to the contact head and configured to
7 laterally displace the contact head so that the closing action of the contact head is
8 parallel to the plane of a semiconductor wafer upon which the microrelay is
9 fabricated.

1 2. The microrelay of claim 1,
2 wherein the electro-thermal actuator comprises a substantially V-shaped
3 beam;
4 wherein thermal expansion caused by current flowing through the
5 substantially V-shaped beam actuates the contact head to make the electrical
6 connection.

1 3. The microrelay of claim 1, wherein the electro-thermal actuator
2 comprises a substantially V-shaped central beam cascaded between two
3 substantially V-shaped side beams, which increase the displacement of the
4 substantially V-shaped central beam during actuation.

1 4. The microrelay of claim 1, wherein the electro-thermal actuator is
2 comprised of:
3 silicon;

4 polysilicon;
5 nickel; or
6 tungsten.

1 5. The microrelay of claim 1, wherein the contact head and associated
2 portions of the first and second signal lines are covered with a layer of sputtered
3 gold.

1 6. The microrelay of claim 1, wherein the contact head is coupled to
2 the electro-thermal actuator through an insulator.

1 7. The microrelay of claim 6, wherein the insulator is comprised of:
2 silicon nitride; or
3 silicon dioxide.

1 8. The microrelay of claim 1, wherein the electro-thermal actuator has
2 a driving voltage in the range of a few Volts.

1 9. The microrelay of claim 1, wherein the shape of the contact head
2 is:
3 square;
4 angled; or
5 rounded.

1 10. The microrelay of claim 1, wherein the microrelay is fabricated
2 using a process that involves:
3 deposition of low-stress silicon nitride as isolation;

4 deposition and patterning of sacrificial silicon dioxide;
5 deposition and patterning of a low-stress silicon nitride connection;
6 deposition and patterning of polysilicon;
7 a partial release operation;
8 sputtering and lift-off of gold; and
9 a full release operation.

1 11. The microrelay of claim 1, wherein the microrelay is an element in
2 an array of microrelays.

1 12. A microrelay, comprising:
2 a first signal line;
3 a second signal line;
4 a contact head configured to make an electrical connection between the
5 first signal line and the second signal line; and
6 an electro-thermal actuator coupled to the contact head and configured to
7 laterally displace the contact head so that the closing action of the contact head is
8 parallel to the plane of a semiconductor wafer upon which the microrelay is
9 fabricated;
10 wherein the electro-thermal actuator comprises a substantially V-shaped
11 beam, wherein thermal expansion caused by current flowing through the
12 substantially V-shaped beam actuates the contact head to make the electrical
13 connection.

1 13. The microrelay of claim 12, wherein the contact head and
2 associated portions of the first and second signal lines are covered with a layer of
3 sputtered gold.

1 14. The microrelay of claim 12, wherein the contact head is coupled to
2 the electro-thermal actuator through an insulator.

1 15. The microrelay of claim 12, wherein the electro-thermal actuator
2 has a driving voltage in the range of a few Volts.

1 16. The microrelay of claim 12, wherein the shape of the contact head
2 is:
3 square;
4 angled; or
5 rounded.

1 17. A process for fabricating a microrelay, comprising:
2 depositing a first low-stress silicon nitride layer as an isolation layer on a
3 semiconductor wafer;
4 depositing and patterning a sacrificial silicon dioxide layer;
5 depositing and patterning a polysilicon layer; and
6 performing a release operation;
7 whereby the process produces,
8 a polysilicon contact head configured to make an electrical
9 connection between a first signal line and a second signal line, and
10 a polysilicon electro-thermal actuator coupled to the contact
11 head and configured to laterally displace the contact head so that
12 the closing action of the contact head is parallel to the plane of the
13 semiconductor wafer.

1 18. The process of claim 17,
2 wherein the electro-thermal actuator comprises a substantially V-shaped
3 beam;
4 wherein thermal expansion caused by current flowing through the
5 substantially V-shaped beam actuates the contact head to make the electrical
6 connection.

1 19. The process of claim 17, wherein prior to depositing and patterning
2 the polysilicon layer, the process further comprises depositing and patterning a
3 second low-stress silicon nitride layer to produce a silicon nitride insulator that
4 couples the contact head with the electro-thermal actuator.

1 20. The process of claim 17, wherein prior to the release operation, the
2 process further comprises producing a layer of sputtered gold on the contact head
3 and the first and second signal lines by:
4 performing a partial release operation to ensure separation of sputtered
5 gold on the contact head and sputtered gold on the first and second signal lines,
6 and also to ensure removal of unwanted gold in the region between the contact
7 head and the first and second signal lines; and subsequently
8 sputtering and lifting off the layer of sputtered gold.